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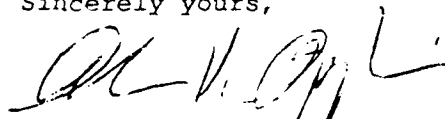
May 1, 1991

Group Leader-Information Sciences
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During the period of April 1, 1990, through March 31, 1991, our research activities focussed on continuing work on symbolic signal processing, new algorithms for signal analysis, and new signal representations based on wavelet analysis.

Our work on this contract during the past year has been reported in detail in the technical literature through technical reports, conference proceedings, and journal articles. Copies of these reports have been provided to the contract monitor and other offices as specified in the contract. Additional copies are available on request.

Sincerely yours,


Alan V. Oppenheim
Distinguished Professor
of Electrical Engineering



AVO/dag

Encl.

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Publications

- [1] Alan V. Oppenheim, "Nonlinear Filtering of Multiplied and Convolved Signals", (with R.W. Schafer and T.G. Stockham, Jr.), (*Proceedings of the IEEE*, 1968), reprinted in Section Seven ("Image Enhancement") of Selected Papers on Digital Image Processing, SPIE Milestone Series, Volume MS 17, SPIE Optical Engineering Press, SPIE, Bellingham, Washington, 1990, pp. 480-507.
- [2] Alan V. Oppenheim, "Reconstruction of Multidimensional Signals from Zero Crossings", (with Susan R. Curtis), Chapter 5 of Image Understanding 1989, Ed. Shimon Ullman and Whitman Richards, Ablex Publishing Corp., Norwood, New Jersey, 1990.
- [3] Michele M. Covell, "An Algorithm Design Environment for Signal Processing", Proceedings, ICASSP90, Albuquerque, NM, April 3-6, 1990.
- [4] Paul E. Beckmann and Bruce R. Musicus, "Fault-Tolerant Round Robin A/D Converter System", Proceedings, ICASSP90, Albuquerque, NM, April 3-6, 1990.
- [5] Gregory W. Wornell, "A Karhunen-Loeve-like Expansion for $1/f$ Processes via Wavelets", Correspondence, IEEE Trans. on Information Theory, Vol. 36, No. 4, July 1990, pp. 859-861.
- [6] Ehud Weinstein, Meir Feder, and Alan V. Oppenheim, "Sequential Algorithms for Parameter Estimation Based on the Kullback-Liebler Information Measure", IEEE Trans. on ASSP, Vol. 38, No. 9, September 1990, pp. 1652-1656.
- [7] Mordechai Segal, Ehud Weinstein, and Bruce R. Musicus, "Estimate-Maximize Algorithms for Multichannel Time Delay and Signal Estimation", IEEE Trans. on Signal Processing, Vol. 39, No. 1, January 1991, pp. 1-16.

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- [8] Michele Covell and John Richardson, "A New, Efficient Structure for the Short-Time Fourier Transform, With an Application in Code-Division Sonar Imaging", accepted for Proceedings, International Conference on Acoustics, Speech, and Signal Processing, ICASSP91, May 14-17, 1991, Toronto, Ontario, Canada.
- [9] James C. Preisig, "A Robust High Resolution Array Processing Algorithm Based Upon Minmax Criteria", accepted for Proceedings, ICASSP91, May 14-17, 1991, Toronto, Ontario, Canada.
- [10] M. Tabei, B.R. Musicus, and M. Ueda, "A Maximum Likelihood Estimator for Frequency and Decay Rate", accepted for Proceedings, ICASSP91, May 14-17, 1991, Toronto, Ontario, Canada.
- [11] Ehud Weinstein, Meir Feder, and Alan V. Oppenheim, "Multi-Channel Signal Separation Based on Decorrelation", submitted to IEEE Trans. on Signal Processing.
- [12] Gregory W. Wornell, "Communication over Fractal Channels", accepted for Proceedings, ICASSP91, May 14-17, 1991, Toronto, Ontario, Canada.

- [13] Gregory W. Wornell and Alan V. Oppenheim, "Estimation of Fractal Signals from Noisy Measurements Using Wavelets", to be published in IEEE Trans. on Signal Processing.
- [14] Gregory W. Wornell and Alan V. Oppenheim, "Fractal Modulation Based on Deterministically Self-Similar Signals", submitted to IEEE Trans. on Information Theory - Special Issue on Wavelet Transforms and Multi-Resolution Signal Analysis.

Technical Reports

- [15] Daniel T. Cobra, "Estimation and Correction of Geometric Distortions in Side-Scan Sonar Images", RLE Technical Report No. 556, May 1990, Research Laboratory of Electronics, MIT, Cambridge, MA.
- [16] E. Weinstein, A.V. Oppenheim, and M. Feder, "Signal Enhancement Using Single and Multi-Sensor Measurements", RLE Technical Report No. 560, November 1990, Research Laboratory of Electronics, MIT, Cambridge, MA.
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Contributed Presentations

- [18] Alan V. Oppenheim, invited presentation, "Chaos, Fractals & Signal Processing", Symposium on the Applications of Wavelets to Signal Processing, Wright-Patterson Air Force Base, Ohio, March 20-22, 1991.
- [19] Alan V. Oppenheim, plenary speaker, "Chaos, Fractals & Signal Processing", Third Biennial Mini Conference on Acoustics, Speech, and Signal Processing, Henderson House, Northeastern University, Weston, MA, April 19, 1991.

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